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(56) Documents cited
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(54) Packaging moisture-laden articles

(57) A storage package for storing moisture-laden articles such as cigarettes includes a shaped receptacle 6 sized to receive a plurality of cigarettes, the receptacle 6 having a moisture control vehicle 7 disposed therein and being within an overwrap 4 having a low moisture vapour transmission rate. The vehicle is treated with a saturated salt solution having a water activity level preselected to the water activity level of the cigarettes to maintain moisture equilibrium over an extended time period.

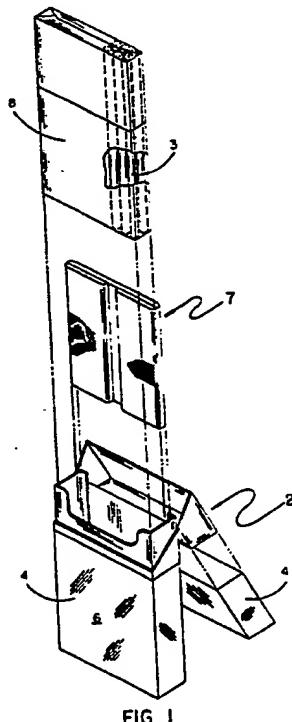


FIG. 1

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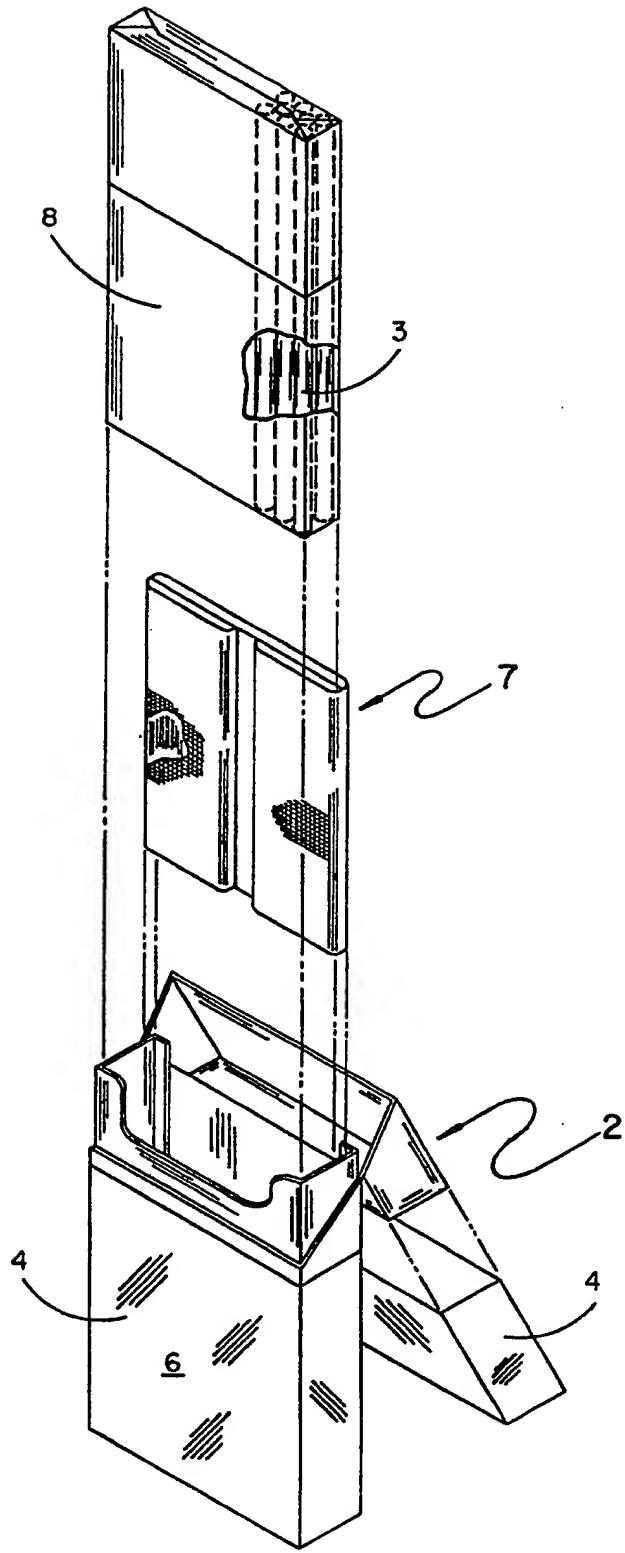


FIG. 1

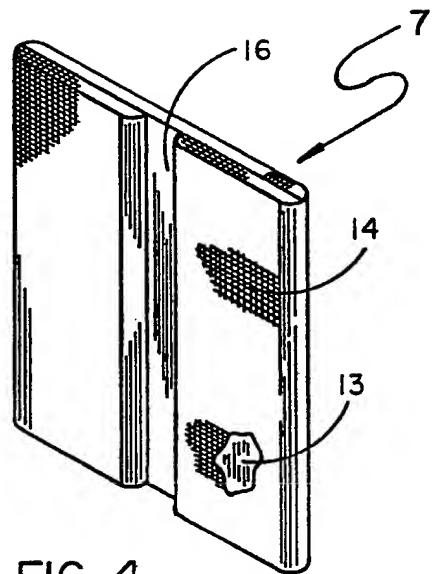


FIG. 4

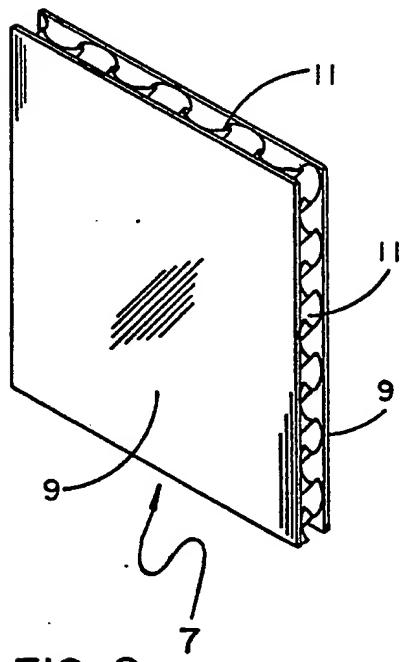


FIG. 2

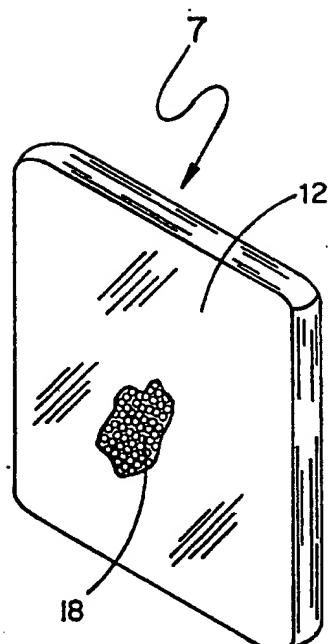


FIG. 3

3 / 3
HUMIDOR PACKAGE TEST

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100 °F, 20 % RH

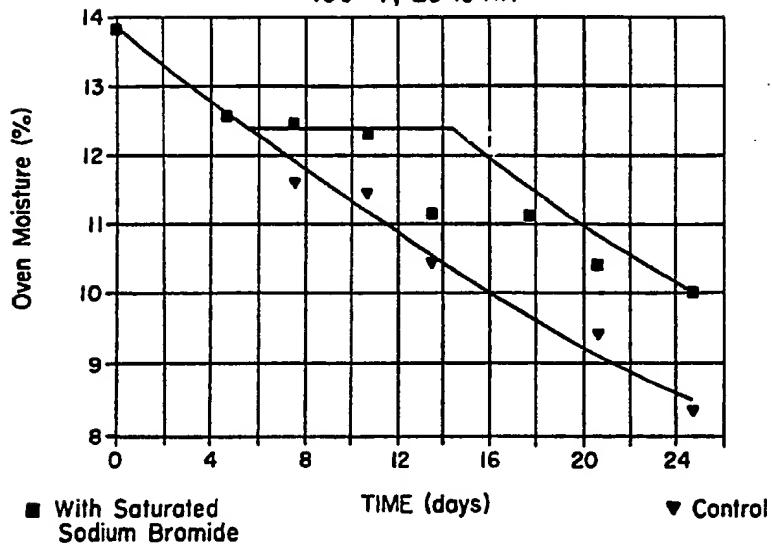


FIG. 5

HUMIDOR PACKAGE TEST

100 °F, 20 % RH

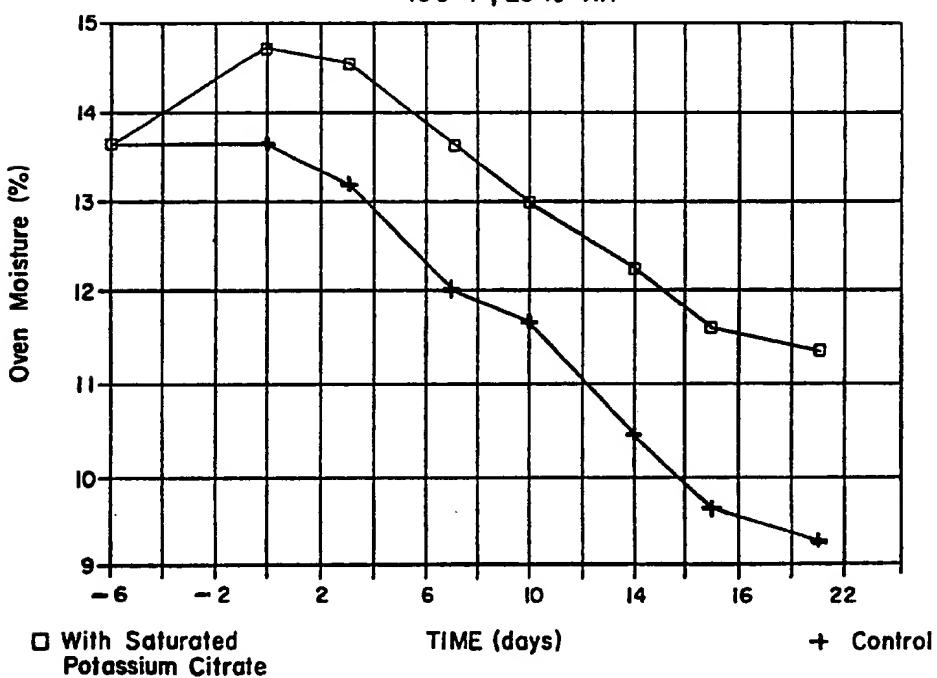


FIG. 6

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IMPROVEMENTS RELATING TO PACKAGING

The present invention relates to storage package structure and more particularly to a package for storing moisture-laden articles to maintain a proper moisture content in the stored articles over an extended period of time such as in the packaging of cigarettes.

It is known in the art of packaging perishable goods of various types such as foods, electronic equipment and tobaccos to keep them either from drying out or absorbing too much moisture by utilizing substantially sealed packages. Such packaging is comparatively expensive, particularly with respect to low cost perishable articles having a short life from the time of packaging to the time of consumption.

A number of packaging structures in the tobacco art have been utilized besides sealing to maintain moisture levels in the package. A number of patents are known in the tobacco art wherein moisturized vehicles in the form of absorbent pads, such as sponges or paper, are included in a package to maintain the humidity of the tobacco. In this regard, attention is directed to a number of United States patents, these being No. 1,205,751, issued to J.J. King on November 21, 1916; No. 1,249,490, issued to J.F. Prather on December 11, 1917; No. 1,711,971, issued to J.W. Schulze on May 7, 1929; No. 1,954,577 issued to T.P. Reddin on April 10, 1934; No. 1,967,554, issued to P.M. Gross et al on July 24, 1934; No. 1,972,118, issued to R.D. McDill on September 4, 1934; No. 1,972,222, issued to P.M. Gross et al on September 4, 1934; No. 1,998,683, issued to F.H. Montgomery on April 23, 1935;

No. 2,227,158, issued to W.H. Saul on December 31, 1940; No. 2,270,603, issued to B.H. Ridder on January 20, 1942; No. 2,276,217, issued to D.P. Lee on March 10, 1942; No. 2,329,908, issued to C.E. Johnson on September 21, 1943; No. 2,333,270, issued to A.M. Opler on November 2, 1943; No. 2,368,140, issued to C.E. Johnson on January 30, 1945; No. 2,443,139, issued to F.A. Krause on June 8, 1948; No. 2,452,957, issued to A.R. Sabin on November 2, 1948; No. 2,497,627, issued to J.E. Pollack on February 14, 1950; No. 2,505,650, issued to P.W. Rodman on April 25, 1950; No. 2,522,952, issued to J. Krohn on September 15, 1950; No. 2,559,297, issued to J.J. Hasbrook et al on July 3, 1951; No. 2,635,937, issued to H.J. Erb, Jr. on April 21, 1953; No. 2,807,514, issued to D.J. Williams on September 24 1957; No. 2,862,779, issued to C.O. Hammond on December 2, 1958; No. 3,135,565, issued to R. Bingham on June 2, 1964; and No. 3,336,093 issued to J.J. Phelps on August 15, 1967. Among these aforesaid U.S. patents, No. 2,270,603 and No. 2,452,957 teach the use of a Glauber salt as a humidifying agent and No. 2,329,908 and No. 2,368,140 teach the use of an outer layer of moisture impervious material in conjunction with the moisturized vehicles employed in the packages. However, neither in the above noted patents nor in any other known prior art is the unique packaging structure of the present invention taught or suggested, the present invention recognizing the desirability of maintaining a preselected relative humidity or water activity within the packaging structure over an extended period of time. Equally, the

the present invention recognizes the importance of accomplishing this balancing of humidification without the occurrence of cigarette spotting, microbial growth or other damage to the packaged article and, at the same time, avoiding imparting undesirable and deleterious tastes and odours to the stored tobacco articles.

The present invention provides a unique and novel packaging structure for storing moisture-laden articles, which structure comprises an overwrap layer having a low moisture vapour transmission rate (MVTR); a shaped receptacle cooperatively disposed with respect to the overwrap layer and preselectively sized and shaped to receive said moisture-laden articles for storing the same; and a moisture control vehicle disposed within said overwrap layer of said package structure, said vehicle being treated with a salt solution having a water activity level preselected in accordance with the water activity level of said moisture-laden articles stored in the package to maintain controlled moisture equilibrium in said stored moisture-laden articles over an extended period of time.

Several variations of salt solutions, moisture control vehicles and geometric configurations thereof, as well as variations of outer wrappers and packaging receptacles - all of which are particularly suited for the moisture control of tobacco articles such as cigarettes - can be employed in packaging structures in accordance with the present invention. An inner wrapper may be provided, which inner wrapper surrounds the moisture-laden articles when packaged within the

shaped receptacle.

It is to be understood that various changes can be made by one skilled in the art in one or more of the several parts of the packaging structure disclosed herein without departing from the present invention.

By use of the present invention, a straightforward, comparatively inexpensive to manufacture and assemble packaging structure for tobacco articles may be provided which contemplates and provides not only balanced humidification over comparatively extended periods of time but does so without requiring large volumes in packaging and without changing moisture conditions within the package structure for the comparatively extended time periods.

In order that the present invention will be clearly understood and readily carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:-

Figure 1 is an exploded isometric view of a packaging structure in the form of a package of cigarettes;

Figure 2 is an enlarged isometric view of one embodiment of a moisture control vehicle which can be included in the package of Figure 1, disclosing a flat paper layer with corrugations therebetween which can be treated with a saturated salt solution which can be in one or more of several forms such as a liquid, gel, paste or powder form, or combination thereof;

Figure 3 is an enlarged isometric view of another embodiment of a moisture control vehicle which can be included

in the package of Figure 1, disclosing a container bag with a high moisture vapour transmission rate (MVTR) containing a saturated salt solution which can be, as above, in one or more of several forms such as a liquid, gel, past or powder form or a combination thereof;

Figure 4 is an enlarged isometric view of still another moisture control vehicle which can be included in the package of Figure 1, disclosing details of an advantageous form of such vehicle in a unique folded pad form which has been treated with a saturated salt solution;

Figure 5 is a graph representing the results of an earlier test of a moisture control vehicle treated with a saturated salt solution of sodium bromide (NaBr) compared with an untreated vehicle, disclosing the improved moisture control results over an extended time period; and

Figure 6 is a graph representing the results of a later test of another moisture control vehicle treated with a saturated salt solution of potassium citrate [$K_3(C_6H_5O_7)$] compared with an untreated vehicle, disclosing the improved moisture control results over an extended time period.

As above discussed, packaged articles may become unacceptable when they dry out and it is known to use a humidifying agent with the packaged articles in an attempt to maintain a preselected relative humidity within the package. As also is above discussed, it is known to utilize packaging overwrap material with reduced moisture permeability and to improve overwrap sealing to extend the shelf life of packaged articles. In the more recent packaging of tobacco articles

such as cigarettes, cigarette manufacturers have concentrated on the latter approach, namely reducing overwrap moisture permeability and improving overwrap sealing.

The present invention recognizes the importance of maintaining a preselected water activity within a package to reduce packaged article moisture loss rate even though moisture loss rate from the package is unchanged. Water activity in air can be defined as the relative humidity (RH) divided by 100 and, in a package, at equilibrium, the water activity for all components within the package is equal. The basic concept of humidification within a package is to provide a reservoir of water within the package to reduce packaged article moisture loss over an extended time period. The present invention recognizes that providing a reservoir of pure water with a packaged article is not satisfactory since too much water may transfer to the article, creating problems in moisture spotting and microbial growth.

To meet this problem the present invention, instead of utilizing just water, as has been past practice, provides an inventively preselected saturated solution so selected that if water passes from the saturated solution to the packaged article, the concentration of water in the saturated solution does not change but rather crystals fall out of the solution and the water activity within the package or the inventively balanced equilibrium does not change until all the water from the solution is exhausted. Only on this occasion - after a time period which has been comparatively extended - will the packaged article lose moisture and dry.

It is recognized by the present invention that ideally tobacco is best conditioned to have an approximate relative humidity of 60% (RH) or, in other words, a water activity of 0.6. Accordingly, when a plurality of cigarettes with such an ideal humidity are placed in a package having a relative humidity of less than 60%, water is soon lost from the package.

Recognizing that saturated solutions are the desideratum to extended life humidification control for packaged moisture-laden articles, the present invention also further recognizes the importance of selecting saturated solutions of certain salts which not only maintain the desired extended moisture equilibrium in the packages containing the moisture-laden articles but which preselected saturated salt solutions, at the same time, do not create deleterious and adverse effects on the packaged articles. In this regard, in accordance with the present invention there are provided saturated solutions of salts which have water activity properties which proximate the ideal water activity of tobacco products such as cigarettes without adversely affecting odour, colour or taste of the cigarettes. In addition, by use of the present invention there may be provided novel packaging structure which attains desired humidification equilibrium in the package over a comparatively extended period of time.

In carrying out the basic inventive concept to place an additional reservoir of water inside a cigarette package to reduce the rate of moisture loss over an extended time period independent of overwrap permeability and package seals,

feasibility tests have been conducted using packaging such as disclosed in Figure 1 of the drawings.

In Figure 1 there is disclosed in exploded view a package structure 2 for storing moisture-laden articles in the form of a plurality of cigarettes 3. The package design was chosen for feasibility tests because it includes an overwrap layer 4 having a very low moisture vapour transmission rate (MVTR) and because it readily provides space for insertion of a selected moisture control vehicle in place of or inclusive of an existing spacer within the package. In this regard and in accordance with the present invention, a sealed overwrap film of flexible transparent polypropylene material can be used. But, in accordance with the present invention, other overwrap materials with low MVTR values such as cellophane(®), polyethylene and polyvinylidene chloride have been found satisfactory, it being important that the overwrap not only have an acceptable visual appearance and touch response but that it have the required low MVTR value to insure the extension of moisture equilibrium life within the package. Receptacle 6 of package structure 2 can be made from a common paperboard stock of stiffened cartonboard or can be formed from any other suitable material such as, but not limited to, foldable paper material used with other types of cigarette packages, the receptacle being preselectively sized and shaped to receive and store a preselected number of moisture-laden cigarettes 3 with a preselected volume of space remaining. It is to be understood that although overwrap layer 4 is located externally of receptacle 6, it also would be possible to

locate the overwrap layer 4 on the inside face of receptacle 6 so long as it is co-operatively disposed with respect to the receptacle 6 and surrounds moisture control vehicle 7, described hereinafter.

To protect cigarettes 3 from spotting or discolouring through the proximity of moisture control vehicle 7, cigarettes 3 are surrounded by an inner wrapper 8 which is an aluminium foil/paper laminate. It is to be understood, of course, that the present invention is not limited to an inner wrapper made of such material but that other types of wrappers can be employed, which ideally are compatible with the types of moisture control vehicles employed.

Although some packages include a corrugated spacer positioned within a cartonboard receptacle 6 between the inner face of receptacle 6 and an inner wrapper 8, which spacers, in accordance with the present invention, can be impregnated over or between corrugations with an appropriate preselected saturated salt solution (described hereinafter) in the form of a liquid, gel, paste or powder or combination thereof, it is to be understood that other types of moisture control vehicles can be employed. For example, standard blotter paper 11 (Figure 2) which can be corrugated - either lined or unlined - and which can be glued to uncorrugated paperboard 9, can be used as can uncorrugated blotter paper which is glued to corrugated paperboard with the humidifying agent inserted between the corrugation as a gel, paste or powder. Further, normal cellulose acetate filter rods (not shown) treated with an appropriate humidifying agent can be employed as a moisture

control vehicle 7.

As can be seen in Figure 3 of the drawings, the moisture control vehicle can be in the form of a pouch or bag 12 made of cellulose acetate film or in the form of dialysis tubing (not shown), both of which have a very high MVTR value when compared to overwrap layer 4. The pouches, like the structure of Figure 2, can be filled with the humidifying agent 18 in gel, paste, liquid or powder form to allow water vapour to pass readily therethrough but not liquid. In addition, pouches made of other materials with a high MVTR value can be employed. The pouches can be of waterproof, woven or nonwoven fabrics with fine pore structure to restrain liquid but capable of allowing water vapour to pass therethrough. Moreover, it has been recognized and identified that some polymer materials such as nylons and ethylene vinyl acetate copolymers also have suitable properties for use as moisture control pouch vehicles. In fact, small semi-rigid containers of appropriate geometric configuration and porosity could work as well as pouches.

Referring to Figure 4 of the drawings, an absorbent pad 13 folded upon itself is disclosed as an advantageous embodiment of a moisture control vehicle for use in receptacle 6. Absorbent pad 13, which can be formed from a suitable woven or nonwoven fabric material, advantageously is faced on one side thereof with a suitable face layer 14 of material such as flexible polypropylene. The absorbent pad material which is impregnated with a humidifying agent is one-half as thick as a flat pad to permit folding upon itself at opposite

edges thereof away from the facing layer 14 to leave a gap 16 between facing edges of the folded pad with face layer 14 protecting the sides and one face of the folded moisture control vehicle from directly abutting the inner walls of the receptacle 6 so as to prevent any undesirable spotting or staining of the receptacle 6.

A number of saturated salt solutions have been identified as having a water activity or relative humidity within a range compatible to the desired relative humidity range for cigarettes, ideally this being approximately 62%RH or 0.62 water activity at 25°C. Among these identified saturated salt solutions, there can be included saturated salt solutions having water activity (or relative humidity) in the range of approximately point five two (0.52) to point six six (0.66). Advantageously included among these saturated salt solutions are saturated salt solutions of sodium bromide (NaBr) and potassium citrate [K₃ (C₆H₅O₇)] (tests of which are described below). In this regard, it is to be noted that the saturated salt solution of sodium bromide is included in Table I below which describes the chemical composition of saturated salt solutions suitable for use in the inventive package structure, there being also set forth in Table I the percent relative humidity of each such saturated salt solution at an indicated temperature (°C) and an indication by reference number to the particular reference literature from which each of such saturated salt solutions was selected. A matching description of these literary references is set forth below Table I. It is to be understood that the solutions can be

made from salts in hydrous or anhydrous form.

TABLE I

Relative Humidity of Selected Saturated Salt Solutions

SALT	RH (%)	TEMP(°C)	REF.
Mg(NO ₃) ₂	52.89	25.0	5
Mg(NO ₃) ₂	52.90	25.0	3
Mg(NO ₃) ₂	52.91	25.0	1
Mg(NO ₃) ₂	54.38	20.0	5
NaBr	56.80	26.6	2
NaBr	57.57	25.0	5
NaBr	57.70	25.0	3
NaBr	58.10	21.7	2
NaBr	59.14	20.0	5
NH ₄ NO ₃	61.80	25.0	3
CoCl ₂	64.92	25.0	5
Mg(C ₂ H ₃ O ₂) ₂	65.00	20.0	4
NaNO ₂	66.00	20.0	4

REFERENCES

1. D.T. Acheson, "Vapour Pressures of Saturated Aqueous Salt Solutions" in A. Wexler and W.A. Wildhack, Eds., "Humidity and Moisture" Vol. 3 Fundamentals and Standards, Reinhold Pub. Co., New York, 1965, P521.
2. C.P. Hedlin and F.N. Trofimenkoff, "Relative Humidities over Saturated Solutions of Nine Salts in the Temperature Range from 0 to 90 F", *ibid* P 519.
3. R.G. Wylie, "The Properties of Water-Salt Systems in Relation to Humidity", *ibid* P507.
4. "Handbook of Chemistry and Physics," 61st edition, The Chemical Rubber Co., Cleveland, (1980) p.E-46
5. Lewis Greenspan, "Humidity Fixed Points of Binary Saturated Aqueous Solutions," *J. Res. Natl. Bur. Stand. (U.S.)*, 81A, No. 1, 89-96 (Jan-Feb. 1977) and References therein.

Set forth below in summary form are experimental results involving recent tests and examinations of saturated potassium citrate solutions and previous tests and examinations of saturated sodium bromide solutions used in combination with moisture control vehicles in inventive package structures.

As above discussed, the basic concept of the inventive

humidor package in so far as it applies to cigarette storage, is to place a solution inside a package of cigarettes which will maintain the relative humidity at about 60% or water activity of 0.60. This reduces the cigarette moisture loss rate even though the rate of moisture loss from the package is unchanged. Depending on the solution used, the moisture lost from the package will come fully or in part from the added solution until the water in the added solution is used up.

The relative humidity maintained by many humectant and saturated salt solutions is listed in the literature. In accordance with the present invention, it has been found that saturated potassium citrate solution maintains relative humidity at 62.5% or water activity at 0.625 at 75°F (29°C). This is ideal for cigarettes.

The effect of temperature on the relative humidity maintained by saturated potassium citrate solutions was measured and reported. This was done because the relative humidity maintained by some solutions drops to such an extent as temperature is increased, that the solution itself could dry out the cigarettes. For saturated potassium citrate solutions, the humidity maintained by the solution goes from 63.3% RH at 20°C to 59.6% RH at 40°C. This relative humidity range is ideal for cigarettes.

Aging Test (Sodium Bromide)

Accelerated aging tests were conducted to test the feasibility of the inventive concept. The aging was accelerated by placing the package in an environment controlled to 100°F (38°C) and 20% relative humidity. These

conditions are generally used to simulate arid desert environments where packaged materials tend to lose moisture rapidly.

Results from an accelerated aging test using a saturated NaBr solution on an inert substrate indicate that the shelf life, which is the length of time that cigarettes remain above 12% moisture, of cigarettes was doubled with the humidor package compared to a package without the solution (the control).

The test showed that the concept behaved basically as predicted. Shelf life was doubled for packages which contained 0.5 cc of a saturated NaBr solution, compared to packages without the solution.

Saturated NaBr solution (0.5 cc) was added to 25 mm sections of unplasticized cellulose acetate filter rods (24.6 mm circ.). The mean weight of solution added was 0.774 g with a standard deviation of 0.007 g. The filter sections were stored over saturated NaBr in a closed container such as a dessicator until used.

In a conditioned area (75°F (24°C), 60% RH), one filter tip per package was placed on top of the internal package spacer in approximately half the packages. These packages were marked with an X. The rest of the packages served as controls.

All packages were then put in a doubled plastic bag until wrapping, by machine, with a suitable polypropylene film commonly used for wrapping cigarette packages. The packages were touched up with a sealing iron to insure good package

seals.

Twenty-one packages each of the test and control were randomly mixed, then placed on edge in an environmental cabinet (100°F (38°C), 20% RH) with a gap between the packages. Five packages each of the remaining test and control packages were then submitted for oven moisture. Package seals were tested on six packages and all were satisfactory. All blew off of the package seal tester (ARJAY Equipment Corporation, U.S. Patent No. 4,539,836) with average readings at blowoff of 153 to 174. If held on by hand, readings went over 200. Package seals were also tested at days 18, 21, and 25. All package seals came back at 101 (the upper limit for the computer printout of this test).

The results are shown in Figure 5. The squares represent the test packages and the triangles represent the controls. The lines were calculated before the test began and the data points were added as they were received.

All data points but one fit the calculated curves reasonably well. Currently, there is no reasonable explanation for the "test" data point at 14 days. There is no reason to believe that there would be two plateaus in the NaBr solution moisture loss curve such as the data shown. There is also no reason to believe that the analysis was in error or that only these three packages had bad seals.

The shelf life (time to drop below 12% moisture) for the control package was about 7 days. The shelf life for the humidor package was 12-14.5 days.,

The reason that the plateau for the humidor package is at

12.5% moisture rather than 13.5% is that at 100°F (38°C) the water activity is 0.54 compared to 0.58 at room temperature. Had the temperature been lowered, such as in an air-conditioned retail store, the cigarette moisture would have been expected to increase.

Aging Tests (Potassium Citrate)

A further aging test was noted. The test was conducted using production cigarettes. Absorbent pads from Kimberly-Clark (DD-53-LE), made in accordance with U.S. Patent No. 4,100,324, were wetted with 0.15 ml water followed by 0.7 ml saturated potassium citrate solution. These were used to replace the corrugated spacer inside the packages. The water was added for two reasons: 1) prewetting the pads with water causes the saturated solution to be absorbed faster, 2) to bring the tobacco and packaging into equilibrium with a relative humidity of 62.5% (the equilibrium relative humidity over saturated potassium citrate solution).

After inserting the pads by hand, test and control packages were placed in plastic bags. The next day they were machine over-wrapped. Six days later the packages were placed in cartons and the cartons were put into a walk-in desert cabinet at 100°F (38°C) and 20% RH. The six-day delay was to allow the moisture to equilibrate throughout the package.

The results of the test are shown in Figure 6. The control packaged cigarettes dropped to 12% moisture in 7 days. The cigarettes in the humidor package dropped to 12% moisture in 15 days. The humidor package thus increased shelf life 2.1 times that of the control package.

Still another accelerated aging test was conducted using 0.7 cc of saturated potassium citrate and 0.15 cc of water on an absorbent pad from Kimberly-Clark (DD-53-UE). The cigarettes in the control package dropped to 12% moisture in 5 days. The cigarettes in the humidor package dropped to 12% moisture in 14 days.

In the three aging tests above described, had the same amount of water been added without the dissolved saturating salts, the cigarette moisture would have been about 17%, 20% and 19% respectively. At these high moisture levels, microbial growth in the cigarettes could occur. In all of the tests described, the cigarette moisture in the humidor packages was below 14.8%.

CLAIMS

1. A package structure for storing moisture-laden articles, which structure comprises an overwrap layer having a low moisture vapour transmission rate (MVTR); a shaped receptacle co-operatively disposed with respect to said overwrap layer and preselectively sized and shaped to receive said moisture-laden articles for storing the same; and a moisture control vehicle disposed within said overwrap layer of said package structure, said vehicle being treated with a salt solution having a water activity level preselected in accordance with the water activity level of said moisture-laden articles to be stored in said package to maintain a controlled moisture equilibrium in said stored moisture-laden articles over an extended time period.
2. A package structure according to Claim 1 and further comprising an inside wrapper surrounding said moisture-laden articles when packaged within said shaped receptacle.
3. A package structure according to Claim 1 or 2, said overwrap layer being disposed externally of said shaped receptacle.
4. A package structure according to Claim 1, 2 or 3, said shaped receptacle being of cartonboard material.
5. A package structure according to any one of Claims 1 to 4, said moisture-laden articles to be stored in said package being tobacco materials.
6. A package structure according to any one of the preceding claims, said moisture-laden articles to be stored in said package being cigarettes.

7. A package structure according to any one of the preceding claims, wherein said moisture control vehicle is impregnated with a salt solution of a type having a water activity of a preselected level below the inherent microbial growth level of the moisture-laden articles to be stored in said package.
8. A package structure according to any one of the preceding claims, wherein said moisture control vehicle comprises a solution -impregnable membrane which allows water vapour from said salt solution to pass therethrough while retaining liquid therein.
9. A package structure according to any one of the preceding claims, wherein said moisture control vehicle is in the form of an absorbent pad impregnated with said salt solution.
10. A package structure according to Claim 9, said moisture control vehicle comprising a film adjacent one face thereof, said pad being folded upon itself at opposite edges away from said film to leave a gap between facing edges of said pad with the film preventing the sides and one face of the folded vehicle from abutting said receptacle.
11. A package structure according to any one of the preceding claims, wherein said salt solution is in the form of a paste.
12. A package structure according to any one of Claims 1 to 10, wherein said salt solution is in the form of a gel.
13. A package structure according to any one of Claims 1 to 10, wherein said salt solution is in the form of a powder.
14. A package structure according to any one of the preceding claims, wherein said moisture control vehicle includes a blotter paper impregnated with said salt solution.

15. A package structure according to any one of the preceding claims, wherein said moisture control vehicle includes filter rod structure impregnated with said salt solution.
16. A package structure according to any one of the preceding claims, wherein said moisture control vehicle includes corrugated paper material treated with said salt solution.
17. A package structure according to any one of the preceding claims, wherein said moisture control vehicle includes a pouch with a high moisture vapour transmission rate to allow water vapour to pass through readily and to retain liquid, said pouch containing a preselected form of salt solution.
18. A package structure according to Claim 17, wherein said pouch comprises cellulose acetate film.
19. A package structure according to any one of the preceding claims, wherein said moisture control vehicle includes dialysis tubing with a high moisture vapour transmission rate to allow water vapour to pass through readily and to retain liquid, said tubing containing a preselected form of salt solution.
20. A package structure according to any one of the preceding claims, wherein said salt solution is a saturated salt solution.
21. A package structure according to any one of the preceding claims, wherein said moisture control vehicle includes a salt solution having a water activity in a range of approximately 0.52 to 0.66.
22. A package structure according to Claim 21, wherein said

moisture control vehicle includes a saturated salt solution of magnesium nitrate having a water activity in the range of approximately 0.52 to 0.54 at temperatures in the range of approximately 20°C to 25°C.

23. A package structure according to Claim 21, wherein said moisture control vehicle includes a saturated salt solution of sodium bromide having a water activity in the range of approximately 0.56 to 0.60 at temperatures in the range of approximately 20°C to 25°C.

24. A package structure according to Claim 21, wherein said moisture control vehicle includes a saturated salt solution of ammonium nitrate with a water activity of approximately 0.62 at a temperature of approximately 25°C.

25. A package structure according to Claim 21, wherein said moisture control vehicle includes a saturated salt solution of cobalt chloride with a water activity of approximately 0.65 at a temperature of approximately 25°C.

26. A package structure according to Claim 21, wherein said moisture control vehicle includes a saturated salt solution of magnesium acetate with a water activity of approximately 0.65 at a temperature of approximately 20°C.

27. A package structure according to Claim 21, wherein said moisture control vehicle includes a saturated salt solution of sodium nitrite with a water activity of approximately 0.66 at a temperature of approximately 20°C.

28. A package structure according to Claim 21, wherein said moisture control vehicle includes a saturated salt solution of potassium citrate with a water activity of approximately 0.60

- to 0.66 at a temperature range of approximately 20°C to 40°C.
29. A package structure according to any one of the preceding claims, wherein said overwrap layer is a polypropylene film.
30. A package structure according to any one of Claims 1 to 27, wherein said overwrap layer is cellophane(®TM).
31. A package structure according to any one of Claims 1 to 27, wherein said overwrap layer is a polyethylene.
32. A package structure according to any one of Claim 1 to 27, wherein said overlap layer is polyvinylidene chloride.
33. A package structure according to any one of Claims 2 to 31, wherein said inner wrapper is of an aluminium foil/paper laminate.
34. A package structure according to any one of Claims 4 to 32, wherein said shaped receptacle is of a preselected weight, stiff foldable paper cartonboard.
35. A package structure according to Claim 1, said shaped receptacle being of a preselected weight, formable and foldable paper material.
36. A cigarette package structure for storing a preselected number of moisture-laden cigarettes comprising a polypropylene overwrap layer having a very low moisture vapour transmission rate; a shaped receptacle disposed within said polypropylene overwrap layer, said receptacle being sized and shaped to receive said preselected number of cigarettes for packaging the same; an aluminium foil laminate inner wrapper surrounding said packaged cigarettes when disposed within said receptacle; and a moisture control vehicle in the form of an absorbent pad having a film adjacent one face thereof, said pad being folded

upon itself at opposite edges away from said film with the film preventing the sides and one face of the folded vehicle from abutting the inner face of said receptacle, said moisture control vehicle for said cigarettes being impregnated with a saturated salt solution of potassium citrate with a water activity of approximately 0.62 at a temperature of approximately 20°C.

37. A cigarette package structure as described hereinabove with reference to Figure 1 of the accompanying drawings or as modified with reference to Figure 2 or Figure 3.